# DETAILS OF THE TECHNIQUE OF A POSTERIOR GASTRO-ENTEROSTOMY.

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THE preliminary preparation of the patient, the isolation of the operative field, the selection of the places in the stomach and the intestine for the anastomosis, the use of rubber-covered clamps, the rapidity of suture without the use of needle-holder, the employment of relatively large needles, the continuous suture, the use of the Pagenstecher linen thread, the very careful attention to every step, absolute cleanliness, absolute hæmostasis: these are the details which mark a new era in the development of the technique of gastro-enterostomy. The operation is consequently attended, to-day, with little if any risk to the individual patient.

Wölfler's method of performing an anterior gastro-enterostomy is of service in certain selected cases, particularly those of malignant disease and of ulcer of the stomach in which the posterior operation is not feasible because of adhesions or infiltration of the stomach wall. It is coming to be recognized by those who are doing stomach surgery, both upon the Continent, in England, and in America, that the nearer to the origin of the jejunum the anastomosis with the stomach is made, the more satisfactory is the convalescence and subsequent course of any individual case. In only one clinic which I visited the past winter (that of Krause) did I find the anterior operation still being used as a routine procedure. In the clinics of Kocher, Czerny, Mikulicz, Von Eiselsberg, Körte, Kümmell, Witzel, Hartmann, Robson, and Moynihan the posterior operation is the operation of choice, each of these surgeons, of course, varying the details in some particulars.

Kocher's method of doing a gastroduodenostomy is advantageous because the exit from the stomach is made proximal to the bile and pancreatic supply. It is a physiological opening that is secured.

Finney's gastropyloduodenostomy is similarly physiological. In my opinion, each of these latter procedures is theoretically, and I surmise practically, preferable to the posterior gastrojejunostomy. Whether the anatomical and physiological results are better after division of the pyloric sphincter or following the gastroduodenostomy of Kocher is yet to be determined. The mobilization of the duodenum after Kocher's suggestion is ordinarily possible.

The patient's mouth and teeth, several days previous to the gastro-enterostomy should be thoroughly cleansed by brush and swab and alkaline wash. For three or four days before operation, the patient should be placed upon a restricted diet. This diet should consist chiefly of liquids and soft solids which do not leave much residue. Twenty-four hours before operation, the diet should be restricted to liquids which have been sterilized—either sterile milk or sterile bouillon. The intestine should be empty, so as to secure to the operator, after the abdomen has been opened, as much room as is possible. Gentle gastric lavage should be made, when not contraindicated, each of three mornings previous to the operation, and again the day of the operation. An empty sterile stomach is a desideratum. Preparation of the skin of the abdomen in the region of the operation should be very thorough. The umbilicus should be especially cleansed. There should be no antiseptic used on the skin the morning of the operation. The skin should be washed with sterile salt solution or with boiled water just previous to operating.

The technique of a posterior gastrojejunostomy, as I am doing it to-day, without a loop is as follows: An ample incision is made through the middle of the belly of the right rectus abdominis muscle. All bleeding points are ligated before incising the peritoneum. A long incision is more desirable than a short one. The technical details of the operation proper are facilitated by an easy exposure of the parts. More thorough inspection is possible through the long incision. Upon opening the abdomen the duodenum and the whole of the stomach should be examined carefully, in order to detect possible lesions. The gall-bladder, the transverse

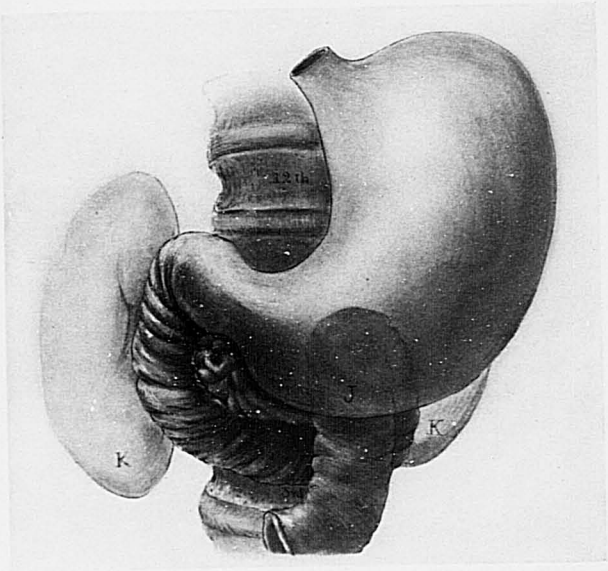


FIG. 1.—To show the relation of the beginning of the jejunum to the posterior wall of the stomach under normal conditions.

Note the tortuous course of the duodenum. Note that the natural place for the anastomosis between stomach and jejunum is where the jejunum rest against the posterior gastric wall.


FIG. 2.—To show the beginning of the jejunum and the peritoneal fold above the superior mesenteric vessel. To show the method of grasping with the left hand the transverse colon and the pushing the posterior stomach wall through the small rent made in the transverse mesocolon. The colic vessels supplying the colon are shown, as well as the vessels of the greater curvature of the stomach.

The omentum is purposely omitted from the drawing.

A line connecting the two points *x* and *y* indicates the best angle at which to apply the clamp to the stomach.

colon, particularly the hepatic and splenic flexures, the pancreas, and the appendix should be especially palpated and their conditions determined and recorded.

The great omentum and transverse colon are lifted completely out of the abdomen at the upper angle of the wound, placed upon a sterile towel covering the sterile abdominal skin, thus exposing the under surface of the transverse mesocolon. While the left hand grasps the transverse colon and omentum, the fingers of the left hand push the posterior wall of the stomach, in its pyloric portion, firmly against the mesocolon. The right hand incises with a knife the transverse mesocolon, thus exposing the posterior wall of the stomach. (Fig. 2.)

This incision is so placed that large vessels are avoided. Its direction is at right angles to the transverse colon's long axis. The incision is enlarged by gentle tearing of the mesocolon. The pressure of the left hand forcing the stomach through the mesocolon assists in the enlarging of the opening in the mesocolon to the required size. The opening in the transverse mesocolon should be some four or five inches long. If by chance there are any bleeding vessels at the edges of the mesocolon opening, these should be ligated. The large colic vessel, which nourishes the transverse mesocolon (Fig. 2), should of course be carefully avoided.

The posterior wall of the stomach is picked up by two pairs of dissecting toothed forceps, thus freeing it from the anterior wall of the stomach which is being pressed against it, and the stomach clamp, as suggested by Littlewood (London *Lancet*, November 3, 1900, page 1276), is applied. The clamp should be placed so as to avoid including, as far as possible, many large vessels. It must be remembered, however, that the large vessels mark the lowest border of the greater curvature of the stomach. This clamp is applied so as to compress the walls of the stomach sufficiently to prevent bleeding and exit of stomach contents. The clamp is placed a little obliquely upon the stomach, in the line joining "x" and "y." (Fig. 2.)

This oblique position is advantageous, according to Moy-

nihan, for upon replacing the stomach and jejunum in the abdominal cavity after the anastomosis is completed, the incision in the stomach lies most naturally against the jejunal incision without undue traction. (See Fig. 1, illustrating anatomical relations of the parts under consideration.) The beginning of the jejunum is next sought a little to the left of the spinal column and at the attachment of the transverse mesocolon. The jejunum is picked up by two pairs of toothed forceps, placed opposite the mesenteric attachment, at that distance from the peritoneal fold, marking the beginning of the jejunum, which is suitable to the case in hand. The nearer to the beginning of the jejunum the anastomosis can be made the more satisfactory will be the result. The clamp is placed longitudinally upon the jejunum opposite to the mesenteric border. The anastomosis is made so that the peristaltic movement of the jejunum occurs in the same direction as the peristaltic movement of the stomach. The clamps upon the stomach and upon the jejunum are placed alongside of each other, thus bringing the parts of the stomach and jejunum to be anastomosed into close apposition, entirely outside the abdominal cavity (Fig. 3).

The omentum and transverse colon are now, if possible, replaced within the abdomen. Two layers of gauze sponge or two layers of towels are placed beneath the clamps so as to protect the underlying tissues. A gauze sponge is placed between the two clamps, thus protecting the area to be anastomosed immediately behind the gut and stomach. (Fig. 3.) It is wise to have the sterile towels wet with hot normal salt solution.

The first, or peritoneal, suture is now taken with curved needle and No. 3 Pagenstecher linen thread. The suture is started at a point farthest from the surgeon and is made towards the surgeon. The suture includes peritoneum and muscular coats. The Cushing suture is used. The initial end of the suture is left long. The curved needle * is of such a size

* I am using a needle made for me as a modification of Moynihan's needle. It is long, and so curved that it may be grasped by finger and thumb firmly without needle-holder, and it picks up just enough tissue to be efficient.

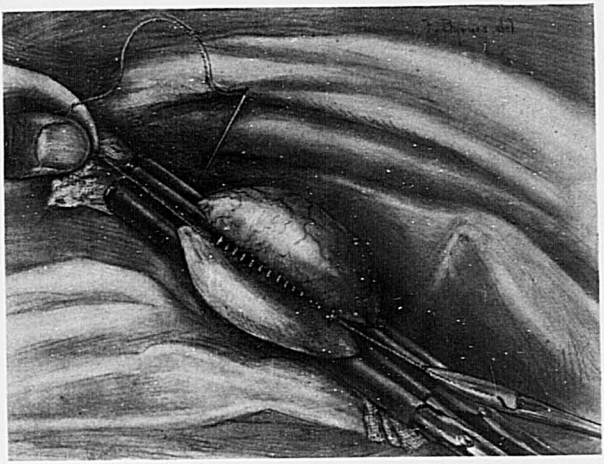

FIG. 3.—To show the clamps applied to the stomach above and to the jejunum below. Note the angle at which clamps are applied. Note the strip of gauze between clamps posteriorly. Note the first half of the peritoneal suture being taken. Note that the suture is not drawn as tightly as usual in order that it may be seen in the drawing.

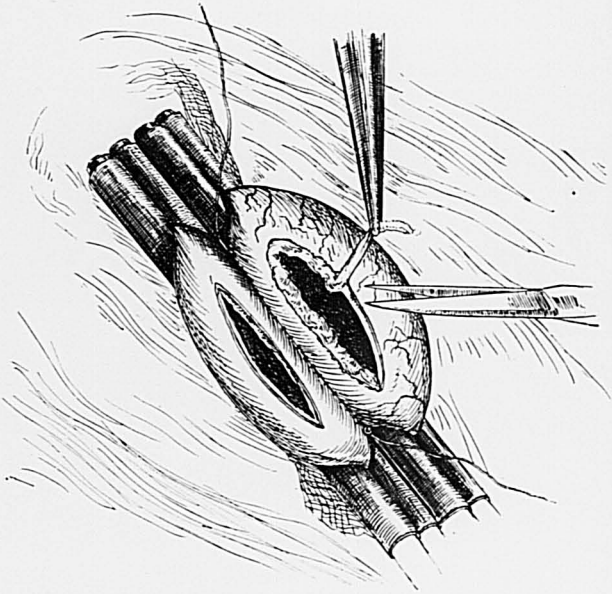

FIG. 4.—To show the removal by scissors of the prolapsed mucous membrane of the stomach, after the incisions into the stomach and intestine. Note that the mucous membrane from the jejunal opening has been already removed. Note that enough is removed to make the peritoneum and mucous membrane level. The first half of the peritoneal suture is shown completed. The gut is seen grasped by the clamps at the mid-portions of the blades of the clamps to secure evenness of pressure.

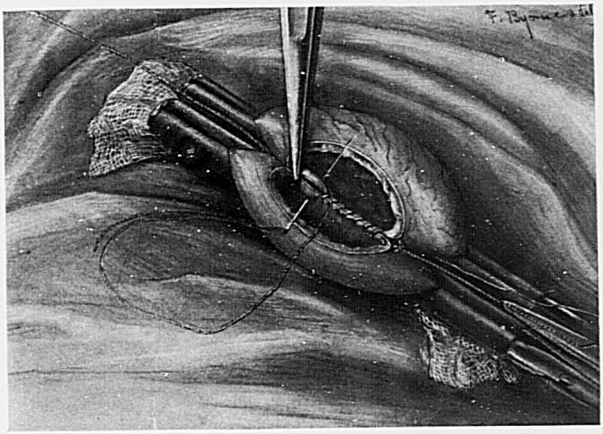

FIG. 5.—To show the taking of the first half of the through-and-through or hæmostatic suture.

Note at the beginning that a seroserous suture is taken and tied, that then the needle passes into the gut and then through and through all layers of both intestine and stomach walls. It is an over-and-over, through-and-through continuous suture.

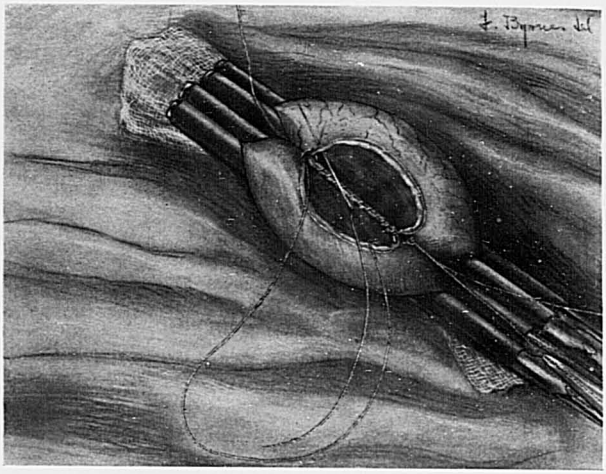

FIG. 6.—To show the second half of the second or through-and-through suture.

The needle passes always from mucous membrane to peritoneum on one side to peritoneum and mucous membrane upon the other side, and then the peritoneal surfaces are always brought into apposition. Note the needle is beginning the return suture.

that it may with ease be used without a needle-holder. Speed is thus gained in suturing. Having completed the first half of the peritoneal suture, the thread is left long, the needle and thread being covered by a wet gauze sponge. This insures complete protection to the suture from infection.

The stomach and jejunum are next opened by a knife incision, parallel with the line of suture just completed. The incision in the jejunum is therefore a longitudinal one. [The transverse incision of Mikulicz and Kocher limits the size of the opening.] The incisions are placed about one-half inch from the line of peritoneal suture. The stomach and jejunum having been opened by the knife, the opening is completed by the use of scissors. The size of the opening made will depend upon the physical conditions present. An opening of from two and one-half to three inches is ordinarily needed. Intestinal contents and stomach contents are carefully removed by tiny gauze sponges at hand for this purpose. By the use of a large sponge the peritoneum is more liable to be soiled. Usually, only a few drops of stomach or intestinal contents present after the incision is made, and are readily removed. Soiling of the peritoneum is precluded. The prolapsed mucous membrane of both the stomach and the jejunum is excised, as suggested by Littlewood (London *Lancet*, November 3, 1900, page 1276), by means of scissors, so that the mucous membrane is level with the peritoneum. (Fig. 4.) This is done to facilitate subsequent suture and to preclude the possibility of slight valve-like obstruction to the lumen of the anastomotic opening. The mucous membrane thus removed should be preserved in a sterile receptacle (a culture tube or sterile gauze), and should be examined microscopically.

The first half of the second suture is now taken with a straight No. 6 milliner's needle and No. 3 Pagenstecher thread. These large, straight needles are most useful. This suture is begun by taking a peritoneal and muscular stitch through both stomach and intestine. (Fig. 5.) The needle is then carried into the lumen of the bowel and through and through all coats of both jejunum and stomach, in an over-and-over continuous suture. Great care must be exercised that the

through-and-through suture includes always the mucous membrane of both stomach and jejunum. If this is done, hæmorrhage is almost impossible. Upon reaching the end of this suture, the needle is carried out from the lumen of the bowel through the peritoneum and tied to the initial peritoneal stitch. Thus peritoneal surfaces are brought into close contact throughout this whole suture. This through-and-through suture serves not only to secure peritoneal approximation over quite a broad surface, but serves as an hæmostatic suture. This continuous through-and-through suture may be interrupted once or twice, as suggested by Littlewood.

Both clamps are now loosened. One of the clamps is removed. The other is left in place, but open, that it may serve as a shelf upon which the bowel and stomach may rest and not slump into the abdominal cavity, as suggested by Munro. (Fig. 8.) Upon loosening the clamps, if there are any bleeding points noticeable, these are secured immediately by a curved intestinal suture. Ordinarily no ligature is required. The lumen of the gut and stomach now being closed, and all possibility of soiling the peritoneal surfaces being eliminated, the whole region should be wiped with sponges wet with hot salt solution, the towel uppermost should be removed, thus leaving the clean second towel exposed. The gauze sponge which lies between the clamps and is behind the suture line is used to make traction upon the anastomosed part and assists in exposing the posterior suture line to inspection. [Moynihan.] Having inspected this part and determined that there is no bleeding, and wiped it thoroughly, this posterior bit of gauze is withdrawn.

The second part of the peritoneal stitch is now completed. The whole field of operation being absolutely clean, the edges of the opening in the mesocolon are sutured to the posterior wall of the stomach in two or three places, by single interrupted Pagenstecher sutures. This prevents contraction of the opening and consequent subsequent constriction of the gut. This suture also prevents a hernia of the small intestine into the lesser cavity of the omentum. There is also less likely, because of this suture, to be a kinking of the gut. The distal

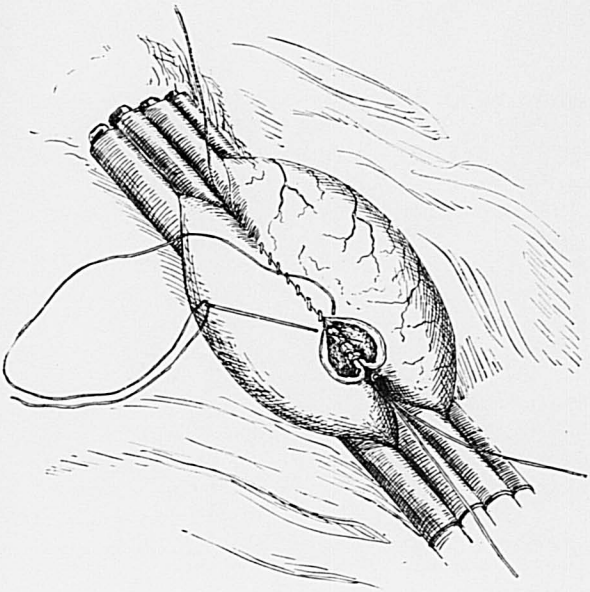

FIG. 7.—To show the completion of the second half of the through-and-through suture. Note how the opening has been gradually closing. Note the needle finishing the stitch. Note, that to finish suture ideally the needle passes through peritoneum last, and is then tied to the first peritoneal suture used at the starting place. See figure. Thus peritoneal surfaces are brought into contact.

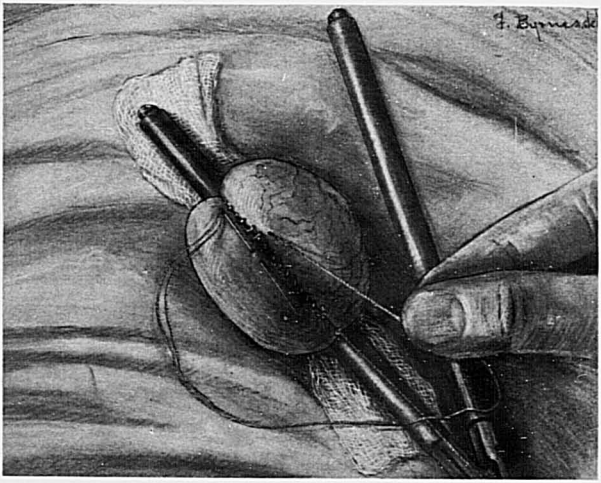

FIG. 8.—To show the second or through-and-through suture completed. To show the second half of the first or peritoneal Cushing suture. Note that the clamp upon the jejunum has been removed. Note that the clamp upon the stomach has been loosened, but that one blade has been retained to serve as a shelf to hold the part well without the abdomen, and thus to prevent slumping of the part until the suture is completed and the parts are cleansed finally.

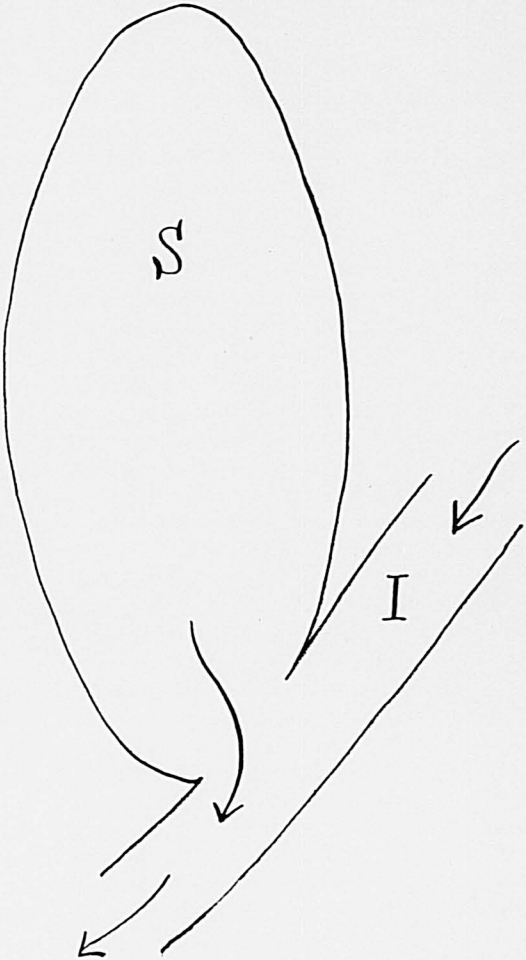


FIG. 9.—To show diagrammatically the location of the opening secured by this operation between the stomach above and anteriorly and the jejunum below and posteriorly. S indicates the stomach cavity. I indicates the intestinal lumen.

portion of the jejunum is now replaced in its natural position, whatever this may be in the individual instance, usually it is to the right of the spine. The omentum is replaced, covering all. The abdominal wound is closed. The patient, on the second day, sits in a semirecumbent posture to facilitate the passage of stomach contents into the intestine.

Treatment subsequent to operation. Nutrient enemata, small in amount, every eight hours may be used for forty-eight hours. Nothing is given by mouth for twenty-four hours, then liquids are given in small quantities at frequent intervals. The amount of nourishment taken by mouth in the third twenty-four hours is gradually increased, until at the end of a week soft solids and minced beef and chicken are allowed.

Of all gastrojejunostomy operations, the technique as described in this communication seems to me to be the most speedy and simple of performance. Risk from infection is completely eliminated. The occurrence of any obstruction (a vicious circle) is most unusual following this technique. Personally, I have had no cases of vicious circle.

Three questions are yet unsolved in connection with the operation of gastro-enterostomy. (*a*) The permanency of the artificial opening when the pylorus is patent; (*b*) the desirability of permanency; and (*c*) the likelihood of an ulcer forming in the jejunum. Roux's method has been followed in a few instances by a peptic ulcer in the distal loop. Roux explains this very reasonably by saying that in the peptic ulcer cases the proximal loop has been anastomosed too far from the stomach opening. He has personally had no such ulcers form because he has joined the proximal loop to the distal loop near to the stomach. The bile and pancreatic juice thus are enabled to neutralize any deleterious effect of the acid gastric juice. I believe that if the anastomosis with the jejunum is made close to its origin, as indicated in the above technique, the slight danger from peptic ulcer will be eliminated. Kocher's gastroduodenostomy and Finney's gastropyloduodenostomy, with slight modifications in the technique as described by Finney, appeal to me physiologically, when anatomically possible of execution, as ideal operations.